

WHAT IS CLAIMED IS:

1. A liquid discharge recording head comprising:  
a recording head main body provided with a plurality of liquid flow paths communicated with a plurality of discharge ports for discharging liquid, respectively, and energy generating means for generating energy utilized for discharging said liquid filled in said liquid flow paths from said discharge ports; and  
an orifice plate provided with a discharge port array having said plurality of discharge ports aligned in one straight line, and bonded to the front face of said recording head main body having openings of said plurality of discharge ports formed therefor, wherein  
said orifice plate is provided with the extended portion in the alignment direction of said discharge port array or in the direction orthogonal to said alignment direction, being extended more than the width of said front face of said recording head main body, and said extended portion is fixed to the adjacent face of said front face of said recording head main body.
2. A liquid discharge recording head according to Claim 1, wherein said extended portion of said orifice plate is fixed to the adjacent face of said front face of said recording head main body by being put between the fixing member to be fixed to said recording head

main body, and the adjacent face of said front face.

3. A liquid discharge recording head according to  
Claim 1, wherein said extended portion of said orifice  
5 plate is fixed by bonding or welding to the adjacent  
face of said front face of said recording head main  
body.

4. A liquid discharge recording head according to  
10 Claim 1, wherein an extrusion is provided for the  
adjacent face of said front face of said head main body  
having the folded portion of said orifice plate to be  
in contact therewith, and said folded portion is in a  
state of riding over said extrusion.

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5. A liquid discharge recording head according to  
Claim 4, wherein a pressure plate for pressing said  
folded portion is arranged in the back of said  
extrusion on the adjacent face of said front face of  
20 said head main body having said folded portion of  
orifice plate being in contact therewith.

6. A liquid discharge recording head according to  
Claim 5, wherein said folded portion is put between  
25 said extrusion and said pressure plate.

7. A liquid discharge recording head according to

Claim 1, wherein the edge portion of said orifice plate is bonded to the face different from said front edge face of said head main body on the opening edge side of said plurality of liquid flow paths, and on the edge  
5 portion of said front face of said head main body and the adjacent face, a cut-off is formed to be extended along said edge portion.

8. A liquid discharge recording head according to  
10 Claim 1, wherein said cut-off is formed on said edge portion to configure the edge portion of the said front face of said head main body and the adjacent face to be in a stepped form.

15 9. A liquid discharge recording head according to Claim 1, wherein the surface of edge portion of said front face of said head main body and the adjacent face is made a curved face.

20 10. A liquid discharge recording head according to Claim 1, wherein the edge portion of said front face of said head main body and the adjacent face is chamfered.

25 11. A liquid discharge recording head according to Claim 9, said orifice plate is bonded to said front face of said head main body, too, and said orifice

plate is in contact by face with the surface of said edge portion of said head main body.

12. A liquid discharge recording head according  
5 to Claim 10, wherein said orifice plate is bonded to  
said front face of said head main body, too, and said  
orifice plate is in contact by face with the surface of  
said edge portion of said head main body.

10 13. A liquid discharge recording head according  
to Claim 9, wherein said orifice plate is bonded to  
only the face different from said front edge face of  
said head main body, and said orifice plate is in  
contact by face with the surface of said edge portion  
15 of said head main body.

14. A liquid discharge recording head according  
to Claim 10, wherein said orifice plate is bonded only  
the face different from said front edge face of said  
20 head main body, and said orifice plate is in contact by  
face with the surface of said edge portion of said head  
main body.

15. A liquid discharge recording head according  
25 to Claim 7, wherein said orifice plate is bonded to  
said front edge portion of said head main body, too,  
and the folded line of said orifice plate is apart from

the edge of said front face of said head main body by a designated distance.

16. A liquid discharge recording head according  
5 to Claim 9, wherein said orifice plate is bonded to said front edge portion of said head main body, too, and the folded line of said orifice plate is apart from the edge of said front face of said head main body by a designated distance.

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17. A liquid discharge recording head according  
to Claim 10, wherein said orifice plate is bonded to said front edge portion of said head main body, too, and the folded line of said orifice plate is apart from  
15 the edge of said front face of said head main body by a designated distance.

18. A liquid discharge recording head according  
to Claim 7, wherein said orifice plate is bonded to  
20 only the face different from said front edge face, and the folded line of said orifice plate is apart from the edge of said front edge face of said head main body.

19. A liquid discharge recording head according  
- - - 25 to Claim 9, wherein said orifice plate is bonded to only the face different from said front edge face, and the folded line of said orifice plate is apart from the

edge of said front edge face of said head main body.

20. A liquid discharge recording head according  
to Claim 10, wherein said orifice plate is bonded to  
5 only the face different from said front edge face, and  
the folded line of said orifice plate is apart from the  
edge of said front edge face of said head main body.

21. A liquid discharge recording head according  
10 to Claim 1, wherein the edge portion of said orifice  
plate is bonded to the face different from the front  
edge face of said head main body on the opening edge  
side of said plurality of liquid flow paths, and a  
groove extending in the direction parallel to said edge  
15 portion is formed on at least a part of the portion  
facing said edge portion on the face of said orifice  
plate on the said head main body side.

22. A liquid discharge recording head according  
20 to Claim 21, wherein said groove of said orifice plate  
is divided into plural numbers.

23. A liquid discharge recording head according  
to Claim 21, wherein the side wall face in said groove  
25 of said orifice plate is inclined to the bottom face of  
said groove.

24. A liquid discharge recording head according to Claim 21, wherein the sectional shape of said groove is in wedge form in the direction perpendicular to the longitudinal direction of said orifice plate.

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25. A liquid discharge recording head according to Claim 21, wherein said groove of said orifice plate is formed in the position excluding both edge portions of said orifice plate.

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26. A liquid discharge recording head according to Claim 21, wherein said orifice plate is adhesively bonded to said front edge face of said head main body.

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27. A liquid discharge recording head according to Claim 1, wherein said head main body is provided with an element substrate having a said energy generating element arranged therefor, a ceiling plate laminated on said element substrate, and a chip tank fixed to the laminated body of said element substrate and said ceiling plate, and

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the front face of said head main body is the front plate portion of said chip tank, and the wall face of said head main body is the side face of said chip tank.

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28. A liquid discharge recording head according to Claim 1, wherein said liquid discharge recording

head is installed on a liquid discharge recording  
apparatus provided with a wiping blade for wiping the  
facing end of said orifice plate by moving relatively  
in a state of being in contact with said facing end,  
5 and provided with an extrusion protruding from the  
facing end of said orifice plate in the vicinity of  
edge portion of said orifice plate on the upstream side  
in the advancing direction of said orifice plate.

10 29. A liquid discharge recording head according  
to Claim 28, wherein no extrusion is formed to protrude  
from the facing end of said orifice plate on the other  
location of said front face of said recording head main  
body than the vicinity of edge portion of said orifice  
15 plate on the upstream side in the advancing direction  
of said orifice plate.

20 30. A liquid discharge recording head according  
to Claim 28, wherein a gap is formed between the inner  
wall of said extrusion on the downstream side in the  
advancing direction of said wiping blade, and the edge  
portion of said orifice plate, and bonding agent or  
sealant is filled in said gap.

25 31. A liquid discharge recording head according  
to Claim 28, wherein a curved face or an inclined face  
is formed on the ridge portion having the outer wall of



said extrusion on the upstream side in the advancing direction of said wiping blade and the ceiling end of said extrusion intersecting with each other.

5           32. A liquid discharge recording head according to Claim 31, wherein said curved face or inclined face is formed to allow the tip end of said wiping blade to be in contact therewith when said wiping blade begins to move in the advancing direction.

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          33. A liquid discharge recording head according to Claim 28, wherein the width of said extrusion in the direction orthogonal to the advancing direction of said wiping blade is formed to be wider than the width of  
15       said wiping blade, and said wiping blade is structured to be in contact with said extrusion over the entire width thereof.

          34. A liquid discharge recording head according  
20       to Claim 28, wherein cleaning means is arranged for cleaning the wiping face of said wiping blade on the upstream side of said extrusion in the advancing direction of said wiping blade.

          35. A liquid discharge recording head according  
25       to Claim 28, wherein the advancing direction of said wiping blade is direction in parallel to the alignment

direction of said discharge port array.

36. A liquid discharge recording head according to Claim 28, wherein the advancing direction of said  
5 wiping blade is direction orthogonal to the alignment of said discharge port array, and the width of said extrusion in the direction orthogonal to the advancing direction of said wiping blade is formed to be larger than the entire length of said discharge port array.

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37. A liquid discharge recording head according to Claim 28, wherein a plurality of said discharge port arrays are arranged in parallel, and said extrusion is formed individually for each of said discharge port  
15 arrays.

38. A liquid discharge recording head according to Claim 28, wherein a plurality of said discharge port arrays are arranged in parallel, and said extrusion is  
20 formed individually for each of discharge port groups to discharge liquid of one and the same kind.

39. A liquid discharge recording apparatus for recording on a recording medium by discharging liquid  
25 to said recording medium for the adhesion of said liquid to said recording medium, comprising:

a liquid discharge recording head according to

either one of Claim 1 to Claim 38; and

a cap member for airtightly closing the area including said discharge ports on the discharge port formation surface having said discharge ports  
5 positioned thereon for said liquid discharge recording head.

40. A liquid discharge recording apparatus for recording on a recording medium by discharging liquid  
10 to said recording medium for the adhesion of said liquid to said recording medium, comprising:

a liquid discharge recording head according to either one of Claim 1 to Claim 38; and

a wiping blade for cleaning the discharge port  
15 formation surface by wiping said discharge port formation surface having said discharge ports positioned for said liquid discharge recording head.

41. A liquid discharge recording apparatus  
20 comprising:

an orifice plate having on the facing end thereof a discharge port array provided with a plurality of discharge ports for discharging liquid aligned in straight line;

25 the recording head main body provided with a plurality of liquid flow paths communicated with each of said discharge ports, respectively, and energy

generating means for generating energy utilized for discharging said liquid filled in said liquid flow paths from said discharge ports, and further comprising:

5           the liquid discharge recording head having said orifice plate being bonded to the front face of said recording head main body having openings formed for said plurality of liquid flow paths, and

          a wiping blade for wiping the facing end of said  
10 orifice plate of said liquid discharge recording head by moving relatively in the state of being in contact with said facing end, wherein

          an extrusion is provided to protrude from the facing end of said orifice plate in the vicinity of the  
15 edge portion of said orifice plate on the upstream side in the advancing direction of said wiping blade.

42. A method for manufacturing a liquid discharge recording head provided with a recording head main body  
20 having a plurality of liquid flow paths aligned in one straight line and communicated with a plurality of discharge ports for discharging liquid, respectively, and energy generating means for generating energy utilized for discharging said liquid filled in said  
25 liquid flow paths from said discharge ports; and an orifice plate provided with a discharge port array having said plurality of discharge ports aligned in one

straight line, and bonded to the front face of said recording head main body having openings of said plurality of discharge ports formed therefor, said orifice plate being provided with the extended portion  
5 in the alignment direction of said discharge port array or in the direction orthogonal to said alignment direction, being extended more than the width of said front face of said recording head main body, and said extended portion being fixed to the adjacent face of  
10 said front face of said recording head main body, comprising the following steps of:

bonding said orifice plate to said recording head main body with the positioning of said discharge port array to said liquid flow path array;

15 folding said extended portion of said orifice plate along a ridge line formed by said front face of said recording head main body and the face adjacent to said front face; and

fixing said extended portion to said front face of  
20 said recording head main body and the adjacent face.

43. A method for manufacturing a liquid discharge recording head according to Claim 42, wherein the step of fixing said extended portion to said front face of  
25 said recording head main body and the adjacent face comprises a step of fixing said extended portion to the face adjacent to said front face by putting the extend

portion between a fixing member for the extended portion to be fixed thereon, and the face adjacent to said front face.

5           44. A method for manufacturing a liquid discharge recording head according to Claim 42, wherein the step of fixing said extended portion to said front face of said recording head main body and the face adjacent to said front face comprises a step of fixing said  
10 extended portion to the face adjacent to said front face of said recording head main body by bonding or welding.

          45. A method for manufacturing a liquid discharge  
15 recording head according to Claim 42, wherein in said step of folding said orifice plate, said orifice plate is folded in a state of riding over an extrusion arranged for said wall face of said head main body.

20           46. A method for manufacturing a liquid discharge recording head according to Claim 45, further comprising the step of holding down said folded portion by a pressure plate in back of said extrusion of said wall face of said head main body.

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          47. A method for manufacturing a liquid discharge recording head according to Claim 46, wherein in said

step of holding down said orifice plate, said folded portion is put between said extrusion and said pressure plate.

5           48. A method for manufacturing a liquid discharge recording head according to Claim 45, further comprising the step of laminating the ceiling plate to the element substrate having said energy generating means arranged therefor to form said head main body by  
10 installing a chip tank on the laminated body of said element substrate and said ceiling plate, wherein  
the front face of said head main body is the front plate portion of said chip tank, and the side walls of said head main body are the side faces of said chip  
15 tank.

49. A method for manufacturing a liquid discharge recording head according to Claim 42, further comprising the step of preparing said head main body  
20 having an extended cutoff formed along the edge portion of said front face of said head main body and the adjacent face on the edge portion of said head main body on the opening side of said plurality of liquid flow paths, and also, preparing said orifice plate.

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50. A method for manufacturing a liquid discharge recording head according to Claim 42, further

comprising the step of preparing said head main body having a curved face surface on the edge portion of said front face of said head main body on the opening side of said plurality of liquid flow paths, and the adjacent face, and also, preparing said orifice plate.

51. A method for manufacturing a liquid discharge recording head according to Claim 42, further comprising the step of preparing said head main body having a chamfered face formed on the edge portion of said front face of said head main body on the opening side of said plurality of liquid flow paths, and the adjacent face, and also, preparing said orifice plate.

52. A method for manufacturing a liquid discharge recording head according to Claim 42, further comprising the step of forming a groove extended in the direction parallel to said edge portion of said head main body at least on a part of portion on the face of said orifice plate facing the edge portion of said front face and adjacent face when said orifice plate is bonded to said head main body.

53. A method for manufacturing a liquid discharge recording head according to Claim 52, wherein in said step of positioning said plurality of discharge ports of said orifice plate to said plurality of liquid flow



paths of said head main body, at least a part of plural  
extrusions formed individually on the circumference of  
said discharge ports on said orifice plate for each of  
said discharge ports are allowed to advance into said  
5 liquid flow paths and fitted into said liquid flow  
paths.

54. A method for manufacturing a liquid discharge  
recording head according to Claim 52, said step of  
10 forming said groove for said orifice plate is executed  
by cutting process for forming said groove at the same  
time of executing the drilling step of forming said  
plurality of discharge ports, and cutting step of  
forming said plurality of extrusions.

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55. A method for manufacturing a liquid discharge  
recording head according to Claim 54, wherein said  
plurality of discharge ports, said plurality of  
extrusions, and said groove are processed using excimer  
20 laser.

56. A method for manufacturing a liquid discharge  
recording head according to Claim 49, wherein before  
the step of folding said orifice plate along said edge  
25 portion of said head main body, a step is provided for  
bonding said orifice plate to said front face of said  
head main body on the opening end side of said

plurality of liquid flow paths.

57. A method for manufacturing a liquid discharge recording head according to Claim 50, wherein before  
5 the step of folding said orifice plate along said edge portion of said head main body, a step is provided for bonding said orifice plate to the front face of said head main body on the opening end side of said plurality of liquid flow paths.

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58. A method for manufacturing a liquid discharge recording head according to Claim 51, wherein before  
the step of folding said orifice plate along said edge portion of said head main body, a step is provided for  
15 bonding said orifice plate to the front face of said head main body on the opening end side of said plurality of liquid flow paths.

59. A method for manufacturing a liquid discharge  
20 recording head according to Claim 52, wherein before the step of folding said orifice plate along said edge portion of said head main body, a step is provided for bonding said orifice plate to the front face of said head main body on the opening end side of said  
25 plurality of liquid flow paths.